

REMARKS/ARGUMENTS***The Pending Claims***

Claims 1-6 and 9-24 are pending currently and are directed to microcapsules comprising a core containing at least one rubber additive, at least two shells made of an amino resin or phenol formaldehyde resin, and a sliding or wearing layer applied to the surface of the microcapsules. Reconsideration of the pending claims is respectfully requested.

The Amendments to the Claims

Claim 1 has been amended to further recite phenol formaldehyde resin. Support for this amendment can be found at, e.g., page 7, ll. 1-4, and in original claim 6.

Claim 6 has been amended to remove phenol formaldehyde resin from a list of amino resins.

No new matter has been added by way of these amendments.

Summary of the Office Action

Claims 1-5, 8-11 and 22-24 stand rejected under 35 U.S.C. § 103(a) as obvious over Menting (i.e., US 2003/0165682). Claim 6 stands rejected under 35 U.S.C. § 103(a) as obvious over Menting in view of Johnson (US 2,623,079). Claims 12-15 and 17-21 stand rejected under 35 U.S.C. § 103(a) over Menting in further view of Okada et al. (US 4,670,344).

The Obviousness Rejections

The obviousness rejections are respectfully traversed. Applicants respectfully request reconsideration of the pending claims as amended and in light of the following arguments.

Menting is directed to microcapsules comprising a composition containing a rubber additive encased in a coating material. Accordingly, Menting characterizes these coating materials as being selected from substances like waxes, paraffins or specific polymers. The description of the coating materials of Menting (i.e., paragraphs [0026] to [0029]) are not equivalent to the shell materials of the present invention. The coating materials of Menting

are more akin to the materials identified for the sliding or wearing layer of the microcapsules of the present invention than to the shell layers of the present invention. That is, the coating materials described by Menting in paragraphs [26] and [27] are similar to feature (c) of pending claim 1. The Office Action admits that Menting fails to disclose two shells, which are formed from an amino resin or a phenol formaldehyde resin, and which are used for encapsulation of the rubber additives. Menting in fact teaches away from the use of two shells for the encapsulation of the rubber additives by alternatively teaching coating the rubber additives with a coating layer that is incomparable to the dual shells according to feature (b) of pending claim 1.

Furthermore, Menting fails to achieve the results of the present invention. According to Menting, rubber additives, such as sulfur particles, are covered with various polymer or wax materials, which share the common feature of having a melting temperature range preferably about 130 degrees C, wherein at lower temperatures capsules are intended to be stable. In fact, the small temperature differences between stability and melting or dissolving of the capsule wall are technologically extremely difficult to control in the rubber process as a result of uncontrolled heating due to friction when mixing the highly viscose mixtures. The temperature differences are too small to allow for release by melting of the capsule wall at the slightly higher temperatures of hot vulcanization as compared to the slightly lower temperatures under mastication conditions. When polymers or waxes are used for microencapsulation of additives (e.g., process aids, reaction components or property-modifying additives), as in Menting, their utility is limited because, under compounding and processing conditions of normal polymer materials, they are deformed, dissolved or destroyed.

An objective of the present invention, which Menting fails to teach or suggest, is to produce microencapsulated sulfur with high mechanical stability under mastication conditions and with a wall material that can be destroyed in the vulcanization step. The Examples provided by Applicants demonstrate the surprising and unexpected success of the present invention at achieving this objective. As described in Examples 2-14, the present invention resulted in the ability to lower the amount of extractable sulfur by magnitudes as well as dual-layer microcapsules with superior stability over mono-layer microcapsules.

Johnson and Okada, taken alone or in combination, fail to cure the deficiencies of Menting because neither Johnson nor Okada teaches or suggests microcapsules comprising a core, two shells and further containing a sliding or wearing layer as recited in the pending claims.

Because the cited references, taken alone or in combination, fail to teach or suggest each and every element of the pending claims as amended, Applicants respectfully submit that the obviousness rejections are improper and should be withdrawn.

Conclusion

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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Date: March 10, 2010